Gamsby and Mannerow
ENGINEERS

ST. GEORGE AREA STUDY
WASTEWATER TREATMENT SERVICING
Responses to Review Comments from GRCA dated May 10, 2013
July 8, 2013

The following are responses to Grand River Conservation Authority (GRCA) review comments on the Assimilative Capacity Assessment of Fairchild Creek in the Final St. George WPCP Optimization Study (Jan. 2012) prepared by Gamsby and Mannerow Limited.

The numbers below correspond with the Plan Review Report prepared by Ashley Wilcox of GRCA dated May 10, 2013.

1. Receiving Stream Dissolved Oxygen and Effluent Total Phosphorus

A key consideration with respect to effluent total phosphorus (TP) and related concentrations of dissolved oxygen (DO) is that there is no statistical difference in DO and TP levels in the receiving stream from upstream to downstream of plant discharge. The stream habitat characteristics cited in the comments are predominantly the same in the vicinity of the plant outfall both upstream and downstream.

In addition, the Aquatic Monitoring Report prepared by Natural Resource Solutions Inc (NRSI) in 2009 concluded that: "For 2009, the benthic invertebrate and water quality data indicates that there is no distinction between reference (upstream) and exposure (downstream) areas on Fairchild Creek". The Assimilative Capacity Assessment report in Appendix B of the Optimization Study document has additional data supporting these statements.

2. Effluent Toxicity

The presence of vibrant communities of aquatic organisms in the actual plant discharge is considered an indication of the non-toxic nature of the effluent. The plant services a predominantly residential community with no large industrial discharges. Based on analysis of historical raw wastewater sampling, the waste stream to the plant is characterized as weak to moderate strength domestic sewage. A degraded aquatic environment would actually not be a favourable environment for minnows and other aquatic life that were observed at the plant outfall on several occasions during the Study.

It is noted that un-ionized ammonia and chlorine are 2 effluent quality parameters related to the St. George Water Pollution Control Plant (WPCP) that are potentially toxic to aquatic organisms in the receiving stream. The plant disinfects using liquid sodium hypochlorite, followed by dechlorination using sodium bisulphite. Analysis of historical effluent quality data confirms that the plant consistently produces an effluent with un-ionized ammonia and residual chlorine levels consistently below CofA objectives and limits, as well as Provincial Water Quality Objectives (PWQO). Further, one of the key recommendations of the St. George WPCP Optimization Study is to convert the method of effluent disinfection from chlorination to ultra-violet (UV) irradiation to eliminate this potential source of

toxicity and well as reduce chlorides in the effluent. Another key recommendation of the Optimization Study is to convert the plant from an extended aeration activated sludge (EAAS) plant to a biological nutrient removal (BNR) plant, which requires a high level of nitrification (i.e. oxidation of ammonia nitrogen), which will result in very low effluent ammonia concentrations.

As described in the Study, the plant outfall is now located in a stranded oxbow of the receiving stream due to long-term natural stream bank erosion. Consequently, there are times of year when the only flow in the stranded oxbow is plant effluent. Benthic invertebrates have restricted mobility and thus spend their complete life cycle (months to years) within a very small reach of the watercourse. They continuously integrate all the independent and interactive effects of all environmental variables and stresses over their life cycle. Without the existing discharge from the St. George WPCP, it is highly likely that there would be no water in this section of Fairchild Creek (because of the cutting through at an oxbow) during certain periods of the year. Most forms of aquatic life, not just benthic invertebrates have serious issues dealing with no water. Most people consider pollution tolerant forms of aquatic life as an improvement over no aquatic life. The standard accepted definition for non-toxic discharges is that a specific test-organism can be exposed to the medium for a continuous period of 96 hours without killing more than 50% of the organisms (standard LC50-96 test for acute aquatic toxicity). Presence of aquatic life (minnows) at the plant outfall for extended periods of time during the Study suggests non-toxic conditions in plant effluent.

3. Rainbow Trout

Environment Canada suggests in their toxicity testing documents "The toxicity test is the determination of the effect of a material on a group of select organisms under defined conditions." It is preferred to use actual aquatic organisms found in the local stream that survived the widely fluctuating conditions found in the watercourse and compare differences upstream to downstream. The current CofA for the plant does not stipulate toxicity testing. Toxicity testing on rainbow trout in controlled laboratory conditions may be conducted during the EA to verify that the effluent is non-toxic. However, unless the instream temperature of Fairchild Creek is 15 (+/- 1) degrees C and dissolved oxygen (DO) above 70 percent saturation all the time, testing on that species may not be warranted.

The MOE Policies and Procedures suggest "site specific assessments" and thus the concept is to base conclusions on aquatic life present in the stream. If rainbow trout (a known sensitive species) isn't present, there is little value in establishing effluent quality criteria based on protecting sensitive species that don't exist there.

4. Impacts on Paris WPCP

Since partially digested sludge from the St. George WPCP undergoes further processing at the Paris WPCP, one of the key considerations in treatment process selection for the upgraded St. George plant was minimizing sludge yield. Minimizing sludge yield reduces all subsequent downstream steps in the sludge management treatment train. However, increased flow and loading at the Paris WPCP from recycle streams from the digester and centrifuge are expected as a result of an expanded St. George plant. Measures such as equalization and a higher level of process control at the Paris WPCP will be considered. This will be addressed in further detail during the EA process.

The County's sludge management strategy for these 2 plants will also be verified during the EA process, i.e. whether to continue with current practice of centralized sludge management at the Paris plant or to provide full sludge treatment independently at each plant.

5. Proposed Effluent Quality Criteria

Proposed effluent criteria were established based on recent effluent quality criteria stipulated in other ECA's and pre-consultations with MOE West-Central Region lead surface water evaluators. The proposed ammonia criteria are based on typically assumed water temperatures and pH such that the discharge will not be acutely toxic to the various forms of aquatic life present in the stream. In addition, Total Nitrogen was added as a new parameter for total nutrient reduction to compensate for a potential marginal increase in TP loading to the Creek at ultimate plant capacity. Ultimate plant capacity and total design flows will be validated as part of the Class EA.

6. Effluent Total Phosphorus

The potential increase in loading of total phosphorus at ultimate plant design capacity of 3,600 m^3/d is something that would have to be dealt with in the Class Environment Assessment. Both the MOE documents "Water Management Policies Guidelines - Provincial Water Quality Objectives" and "Deriving Receiving Water Based Point Source Effluent Requirements for Ontario Waters" allow for increases in Policy 2 parameters under certain special circumstances.

Proposed effluent quality can also take into consideration Total Phosphorus Management (TPM) which is an approach recognized by MOE and the Conservation Authority. It is noted that total phosphorus loading from sewage treatment plant discharges within the watershed is a small percentage of the overall total phosphorus loading to the Grand River and Lake Erie. This issue is something that must be dealt with in the Class EA.

7. Statistical Analysis

Statistical analysis was undertaken with results presented throughout the Assimilative Capacity Assessment report (see Appendix B of the Optimization Study). Further, available water quality information was obtained from several sources and analyzed in the report, including OCWA (routine monitoring under CofA requirements) GRCA, MOE Provincial Water Quality Monitoring Network (PWQMN), Environment Canada Water Survey of Canada (WSC), Natural Resource Solutions Inc. (NRSI), and MNR. In addition, this was supplemented by targeted sampling and analysis of the site area during the annual low flow period as requested by MOE.

8. Statistical Analysis

See response to Item 7 above. Also, there must be some confidence in the usefulness of the resultant statistics. Due to the cutting through at an old oxbow, the "upstream samples" collected by plant operators are no longer representative of upstream water quality of Fairchild Creek. It is not known when the main stream channel cut through and stranded the oxbow. In the case of PWQMN data, the parameters and sampling frequency have changed over the years which contribute to difficulties in making statistical analyses other than basic analysis of the data. It is noted that in most Certificates of Approval issued by MOE, effluent quality is based on averages.

9. Future Impact on Receiving Stream

It is noted in the Optimization Study that discharge of high quality non-toxic effluent can be beneficial to the receiving stream to maintain a minimum base flow to support aquatic life. One of the Habitat Management/Rehabilitation options in the Grand River Fisheries Management Plan for Fairchild Creek is to increase base flow. Expanding a WPCP discharging advanced treated non-toxic effluent is consistent with this option. An expanded WPCP could provide a dependable source of water during the summer low flow periods. This position is recognized by MOE. The detail as to how beneficial this would be to Fairchild Creek can be addressed in the EA. Once an EA is underway and certain variables are agreed upon, various scenarios can be analyzed in detail. If the approach chosen as part of the EA is similar to what is currently proposed in the Optimization Study, detailed analysis will confirm that Fairchild Creek, the Grand River or Lake Erie should not be deteriorated as a result of the proposed WPCP expansion.

Respectfully submitted.

Yours truly,
GAMSBY AND MANNEROW LIMITED
Per:

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